Progress Energy

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10 CFR 50.73

December 10, 2008
3F1208-05

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: CRYSTAL RIVER UNIT 3 - LICENSEE EVENT REPORT 50-302/2008-003-01

Reference: CR-3 to NRC Letter dated October 21, 2008, "CRYSTAL RIVER UNIT 3 - LICENSEE EVENT REPORT 50-302/2008-003-00"

Dear Sir:

Florida Power Corporation, currently doing business as Progress Energy Florida, Inc., hereby submits Revision 1 to Licensee Event Report (LER) 50-302/2008-003-00 (Reference). The LER discusses a manual reactor trip due to Main Feedwater System oscillations caused by an inadequate design. This revision is necessary based on completion of the root cause investigation for this event. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A).

No new regulatory commitments are contained in this submittal.

If you have any questions regarding this submittal, please contact Mr. Dan Westcott, Supervisor, Licensing and Regulatory Programs, at (352) 563-4796.

Sincerely,

for J.W.H

James W. Holt
Plant General Manager
Crystal River Nuclear Plant

JWH/dwh

Enclosure

xc: Regional Administrator, Region II
Senior Resident Inspector
NRR Project Manager

Progress Energy Florida, Inc.
Crystal River Nuclear Plant
15760 W. Powerline Street
Crystal River, FL 34428

IE22
NRR

NRC FORM 366 (9-2007)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB: NO. 3150-0104	EXPIRES: 08/31/2010

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE
Manual Reactor Trip Due To Main Feedwater System Oscillations Caused By An Inadequate Design

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
08	24	2008	2008	- 003 -	01	12	10	2008	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
~60%	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Dennis W. Herrin, Lead Engineer (Licensing and Regulatory Programs)	352-563-4633

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	SD	CPLG	E120	Y					

14. SUPPLEMENTAL REPORT EXPECTED		15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)*	☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

At 15:53 on August 24, 2008, Progress Energy Florida, Inc. (PEF), Crystal River Unit 3 (CR-3) was operating in MODE 1 (POWER OPERATION) at approximately 60 percent RATED THERMAL POWER, when the reactor was manually tripped. At 15:37, the Condensate Pump CDP-1A magnetic coupling became uncoupled. Delays in rapid power reduction led to a low Deaerator (FWHE-1) level and eventual cavitation of the Main Feedwater (FW) System booster pumps and Main FW pumps. The cavitation caused a loss of FW flow control to the Once-Through Steam Generators. This loss of flow control led to the decision to manually trip the reactor. The root cause for this event was original plant design failing to provide adequate alarms to the operating crews to promptly identify Condensate Pump failures. Required equipment operated as designed during the manual reactor trip. Loss of FW is an analyzed event bounded by the CR-3 Final Safety Analysis Report accident analysis. This condition does not represent a reduction in the public health and safety. Operating crews were trained on this event. Compensatory measures to alert the operating crew of a loss of a Condensate Pump were established. Design options are being evaluated to alert the operating crew of Condensate Pump failures. A previous similar occurrence has not occurred or been reported to the NRC.

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EVENT DISCRIPTION

At 15:53 on August 24, 2008, Progress Energy Florida, Inc. (PEF), Crystal River Unit 3 (CR-3) was operating in MODE 1 (POWER OPERATION) at approximately 60 percent RATED THERMAL POWER, when the reactor was manually tripped due to instability of several key plant parameters, including reactor power, Main Feedwater (FW) System [SJ] flow and Once-Through Steam Generator (OTSG) [SB, SG] level.

At 15:37 on August 24, 2008, the Condensate Pump CDP-1A [SD, P] magnetic coupling (Electric Machinery, Model MSD4404V) [SD, CPLG] became uncoupled and resulted in numerous alarms in the Main Control Room. The alarms were a result of, but not a direct indication of, the failure. This resulted in distractions and significant lowering of Condensate System [SD] flow. Lowering Deaerator (FWHE-1) [SD, TK] level was not immediately diagnosed. In response to a lowering FWHE-1 level and recognition that CDP-1A amperage was well below normal, efforts to re-couple CDP-1A were directed, concurrent with entry into Abnormal Operating Procedure AP-510, "Rapid Power Reduction." Reactor power was reduced from 100 percent RATED THERMAL POWER and stabilized at approximately 62 percent RATED THERMAL POWER with the FWHE-1 level recovering.

At this time, FW block valve FWV-29 [SJ, ISV] to the "B" OTSG began to close, lowering the "B" OTSG level. FW block valve FWV-30 to the "A" OTSG remained full open. Oscillations were observed to be occurring on Main FW pump FWP-2B [SJ, P] flow between 0-100 percent demand while FWP-2A flow was pegged high. In response to the high FW System [SJ] flow condition on the "A" OTSG, FWV-30 was placed in manual and closed. FW System flow oscillations were still occurring, along with resultant reactor power oscillations, so the decision was made to manually trip the reactor. A turbine trip occurred simultaneously. Following completion of post-trip actions, FWP-2B oscillations continued. FW cross-connect valve FWV-28 was opened and FWP-2B was manually tripped.

No structures, systems or components were inoperable at the start of the event that contributed to the event. No other pertinent maintenance or surveillance activities were in progress. Plant protection and non-protection systems operated normally during the manual reactor trip, with the exception of the following:

> FWP-2A locked in at 100% demand during the power reduction causing control issues and overfeed of the "A" OTSG. The FWP-2A Woodward 505 digital governor controller [SJ, 65] interpreted a transient condition as a control failure due to a circuit design feature and locked in at the last good signal.

At 18:03 on August 24, 2008, a 4-hour notification to the NRC Operations Center (Event Number 44438) was made in accordance with 10 CFR 50.72(b)(2)(iv)(B) for manual actuation of the Reactor Protection System (RPS) [JC]. An update was provided at 19:21 on August 24, 2008. This condition is being reported as a 60-day Licensee Event Report under 10 CFR 50.73(a)(2)(iv)(A) for manual actuation of the RPS.

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SAFETY CONSEQUENCES

Manual actuation of the RPS was initiated to shut down the reactor and maintain adequate OTSG levels. Upon initiation of the manual reactor trip, the RPS responded as expected, control rods fully inserted and safety systems functioned as required. No challenges to the RPS setpoints were identified. No Emergency Feedwater Initiation and Control System [BA] actuation occurred or was expected. Both OTSGs were fed by the FW System throughout this event.

This event did not result in the release of radioactive material. No design safety limits were exceeded and no fission product barriers or components were damaged as a result. The loss of Feedwater is an event analyzed and bounded by the Final Safety Analysis Report accident analysis.

Based on the above discussion, PEF concludes that manual actuation of the RPS did not represent a reduction in the public health and safety.

This event is not reportable under 10 CFR 50.73(a)(2)(v) and does not represent a condition that would have prevented the fulfillment of a safety function. Therefore, this event does not meet the Nuclear Energy Institute (NEI) definition of a Safety System Functional Failure (Reference: NEI 99-02, Revision 5).

CAUSE

The root cause for this event was original plant design failing to provide adequate alarms to the operating crew to promptly identify Condensate Pump failures. No Condensate Pump uncoupled alarm was or should have been received in the Control Room following the loss of CDP-1A. These alarms actuate when a low magnetic coupling supply voltage is sensed. Since these alarms originate in the Condensate Pump controllers, a failure of the Condensate Pump magnetic coupling itself, as occurred in this event, will not result in an alarm.

Corrective Actions

1. A Just-In-Time training package was developed for this event and operating crews were trained prior to assuming watch standing duties with the reactor critical. Operator selected alarms were established to alert the operating crews to Condensate Pump failures as an interim compensatory measure.

2. The CDP-1A motor and clutch assembly was replaced with a refurbished spare under Work Order 1406343. (Nuclear Condition Report (NCR) 294686)

3. The FWP-2A Woodward 505 digital governor controller was modified by Engineering Change 71126 (Work Order 1407302) to limit the signal range received from the Integrated Control System, bypassing the lockout feature. (NCR 293609)

4. Design options are being evaluated in the CR-3 Corrective Action Program to alert the operating crew of Condensate Pump failures. (NCR 293080-04)

5. Additional corrective actions are identified in NCR 293080.

PREVIOUS SIMILAR EVENTS

Four losses of a Condensate Pump have occurred at CR-3 since March 3, 2000. None of these events revealed a problem with the original plant design associated with Condensate Pump loss indication in the Control Room. No previous similar events have been reported to the NRC.

ATTACHMENTS

Attachment 1 – Abbreviations, Definitions, and Acronyms
Attachment 2 – List of Commitments

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Attachment 1

Abbreviations, Definitions, and Acronyms

AP	Abnormal Operating Procedure
CDP	Condensate Pump
CFR	Code of Federal Regulations
CR-3	Crystal River Unit 3
FWHE-1	Deaerator
FW	Main Feedwater System
FWP	Main Feedwater Pump
FWV	Main Feedwater Valve
NCR	Nuclear Condition Report
NEI	Nuclear Energy Institute
NCR	Nuclear Condition Report
NRC	Nuclear Regulatory Commission
OP	Operating Procedure
OTSG	Once-Through Steam Generator
PEF	Progress Energy Florida, Inc.
RPS	Reactor Protection System
SSO	Superintendent Shift Operations

NOTES: Improved Technical Specification Defined terms appear capitalized in LER text {e.g., MODE 1}.

Defined terms/acronyms/abbreviations appear in parenthesis when first used {e.g., Reactor Building (RB)}.

EIIS codes appear in square brackets {e.g., reactor building penetration [NH, PEN]}

Attachment 2

LIST OF COMMITMENTS

The following table identifies those actions committed by PEF in this document. Any other actions discussed in the submittal represent intended or planned actions by PEF. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Supervisor, Licensing and Regulatory Programs of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	DUE DATE
No new regulatory commitments are contained in this submittal.	N/A